The effects of goal types on psychological outcomes in active and insufficiently active adults in a walking task

Rebecca M. Hawkins [a*], Lee Crust [a], Christian Swann [b, c] and Patricia C. Jackman [a]

[a] School of Sport and Exercise Science, University of Lincoln, Brayford Pool, Lincoln, United Kingdom

[b] School of Health and Human Sciences, Southern Cross University, Hogbin Drive, Coffs Harbour, Australia

[c] Centre for Athlete Development, Experience & Performance, School of Health and Human Sciences, Southern Cross University, Coffs Harbour, Australia

* Corresponding author: Rebecca Hawkins, School of Sport and Exercise Science, University of Lincoln, Brayford Pool, Lincoln LN6 7TS, United Kingdom. Email: rhawkins@lincoln.ac.uk

Abstract

Objectives: This study aimed to extend recent work on the effects of goal types in physical activity (PA; Swann et al., 2019) by comparing the effects of SMART, open, and do-your-best (DYB) goals on performance and psychological responses in active and insufficiently active adults in a walking task.

Design: 4 (goal condition) x 3 (attempt) x 2 (group) mixed design.

Methods: Active ($n = 18$) and insufficiently active ($n = 18$) participants completed baseline and two experimental attempts of a 6-minute walking test in four conditions: SMART goal; open goal; DYB goal; and control. A range of measures were taken during and following each attempt, and after each session. A series of mixed ANOVA's were conducted for all measures assessed between groups.

Results: Insufficiently active participants achieved greater distances in the open condition compared to the SMART condition ($p < .001$), whereas active participants achieved greater distances in the SMART condition compared to the open condition ($p < .001$). Additionally, exploratory analyses revealed that insufficiently active participants reported greater pleasure and enjoyment ($p < .05$) in the open condition compared to active participants, who conversely reported more pleasure and enjoyment ($p < .05$) in the SMART condition than insufficiently active participants.

Conclusions: Findings provide initial evidence that PA and psychological responses differ between active and insufficiently active individuals depending on goal type. This work has potential implications for goal setting strategies in PA promotion and raises further questions about current practices of setting SMART goals for insufficiently active participants.

Keywords: affect; behaviour change; enjoyment; exercise; goal setting; physical activity.

Highlights

1. Active and insufficiently active adults took part in four 6-minute walking sessions.
2. All participants took part in three experimental conditions and a control condition.
3. SMART goals elicited the most positive affect and enjoyment in active adults.
4. Open goals produced the most pleasure and enjoyment in insufficiently active adults.
5. Findings offer more evidence of the efficacy of open goals in physical activity.

The effects of goal types on psychological outcomes in active and insufficiently active adults in a walking task: Further evidence for open goals

Abstract

Objectives: This study aimed to extend recent work on the effects of goal types in physical activity (PA; Swann et al., 2019) by comparing the effects of SMART, open, and do-your-best (DYB) goals on performance and psychological responses in active and insufficiently active adults in a walking task.

Design: 4 (goal condition) x 3 (attempt) x 2 (group) mixed design.

Methods: Active (n = 18) and insufficiently active (n = 18) participants completed baseline and two experimental attempts of a 6-minute walking test in four conditions: SMART goal; open goal; DYB goal; and control. A range of measures were taken during and following each attempt, and after each session. A series of mixed ANOVA's were conducted for all measures assessed between groups.

Results: Insufficiently active participants achieved greater distances in the open condition compared to the SMART condition (p < .001), whereas active participants achieved greater distances in the SMART condition compared to the open condition (p < .001). Additionally, exploratory analyses revealed that insufficiently active participants reported greater pleasure and enjoyment (p < .05) in the open condition compared to active participants, who conversely reported more pleasure and enjoyment (p < .05) in the SMART condition than insufficiently active participants.

Conclusions: Findings provide initial evidence that PA and psychological responses differ between active and insufficiently active individuals depending on goal type. This work has potential implications for goal setting strategies in PA promotion and raises further questions about current practices of setting SMART goals for insufficiently active participants.

Keywords: affect; behaviour change; enjoyment; exercise; goal setting; physical activity.

The effects of goal types on psychological outcomes in active and insufficiently active adults in a walking task: Further evidence for open goals

Goal setting is a commonly used strategy that is often recommended for promoting behaviour change in physical activity (PA; see McEwan et al., 2016 for a meta-analysis). A goal refers to the object or aim of an action and is defined as the outcome an individual is trying to achieve (Locke et al., 1981). One widely implemented goal setting strategy is the 'SMART' acronym (Doran, 1981), which typically outlines that a goal should be: (i) specific (i.e., focus on attainment of a specific standard or level of proficiency on a task); (ii) measurable (i.e., allows evaluation); (iii) achievable (i.e., within the individual's capabilities); (iv) realistic (i.e., the goal presents sufficient demand but is attainable); and (v) timed (i.e., with a set completion timeframe; American College of Sports Medicine [ACSM], 2017). Upon inspection of current PA guidelines (e.g., ACSM, 2017; National Health Service [NHS], 2019), it is arguable that the majority of leading health organisations and initiatives (e.g., Moving Medicine, 2019) employ the SMART acronym for PA guidelines.

Despite the widespread application of SMART goals, in a meta-analysis comparing goal constructs, McEwan et al. (2016) found that specific goals were no more effective than vaguely defined goals (e.g., to be more active) for increasing PA. Recently, Swann and Rosenbaum (2018) raised concerns with current practice on the basis that goal setting theory states that "specific, challenging goals may actually hurt performance in certain circumstances" and that this could potentially be more harmful "during the early stages of learning a new, complex task" (Latham & Locke, 1991, p. 229). Specifically, Swann and Rosenbaum (2018) suggested that increasing PA levels could be regarded as a complex task for insufficiently active individuals. This argument was based on Drach-Zahavy and Erez's (2002) categorisation of task complexity as when an individual must: (1) simultaneously attend to task frequency, intensity, duration, mode and cost (i.e., component complexity); (2)

schedule, organise, and prioritise when becoming physically active (i.e., coordinating complexity); and (3) change levels of commitment, motivation, and overcome difficulties (i.e., dynamic complexity). In turn, this perspective of PA as a complex task raises questions regarding current practice, including that based on the SMART acronym, which might not be the most suitable for promoting PA for those who are insufficiently active or are in the early stages of PA engagement (McEwan et al., 2016; Locke & Latham, 1991).

As doubt has been raised about the potential impact and utility of SMART goals, it is important to consider alternatives. Recent research suggests that "open goals" could be a promising alternative goal setting strategy for PA promotion (Swann et al., 2019). Open goals were initially reported by athletes in qualitative research (Swann et al., 2016, 2017) and do not include specific or objective outcomes – instead they are exploratory in nature (e.g., "see how well you can do"; Schweickle et al., 2017). Another type of goal that warrants further attention is a do-your-best (DYB) goal (e.g., "do-your-best to increase your daily step count"). Do-your-best goals refer to a pre-existing knowledge of performance, which is anchored to a marker of 'best', and therefore attached to expectations of exerting high effort. Conversely, open goals may be more flexible in permitting an individual to determine their own effort and make no reference to a pre-existing performance level, which could be linked to high effort and/or expectations. Previously DYB goals have been used as control conditions when testing goal setting theory and the effects of SMART goals (e.g., Giannini et al., 1988). Indeed, DYB goals have been reported to produce beneficial performances and psychological outcomes when compared to other goal types (e.g., Boyce, 1994) and a control (no goal) condition (Swann et al., 2019), suggesting that further investigation of this goal type is also warranted.

Swann et al. (2019) compared the effects of open, SMART, and DYB goals to a control condition on performance (i.e., distance achieved) and psychological responses in a walking task in healthy adults. Findings indicated that open goals elicited highest perceptions of performance and greatest interest in repeating the session, while SMART goals led to highest levels of pressure/tension. This study provided initial evidence for the potential benefits of open goals in increasing PA among healthy adults. However, the majority of participants in Swann et al. (2019) were highly active (*n* = 32) or moderately active (*n* = 31), with the minority participating in low PA (*n* = 15). A further limitation to this previous work is that while PA level was incorporated as a covariate, it was not systematically addressed in the study design. No study has yet examined how the same individual responds to open, SMART, and DYB goals, or investigated how individuals at different stages of PA engagement (e.g., active or insufficiently active according to recommended guidelines for PA) respond to open goals compared to other goal types. This may be important given concerns surrounding the use of specific/SMART goals for insufficiently active individuals (Swann & Rosenbaum, 2018). Therefore, an extension of research by Swann et al. (2019) is warranted to: (1) examine the effect of each goal type on individuals by using a between-conditions repeated measures design (i.e., rather than only experiencing a single experimental goal condition); and (2) compare psychological responses elicited by each goal type between active individuals (i.e., who are currently meeting PA guidelines) and insufficiently active individuals.

It is also critical to extend understanding of the psychological responses that are elicited as a result of adopting different goal types. One psychological variable that has been consistently linked to long-term PA engagement is affect (see Rhodes & Kates, 2015 for a meta-analysis). Affect refers to the generalised feelings of pleasure and displeasure that an individual experiences (Kiviniemi et al., 2007). Accordingly, positive affect broadly refers to feelings such as enjoyment, pleasure, calmness, energy, and vitality, while negative affect can encompass boredom, anxiety, or tension. Importantly, positive affect has been consistently linked to heightened intentions to exercise, and has been reported to predict future exercise behaviours and sustained PA when experienced during exercise (Rhodes & Kates, 2015). An increased understanding of how individuals can experience positive affect in exercise could therefore be integral to promoting PA (Ekkekakis et al., 2013). While Swann et al. (2019) found no significant differences in recalled affect between open, SMART, and DYB goals, there are a number of limitations with the assessment of affect that they employed. First, conceptual and methodological concerns have been raised with the measure (Subjective Exercise Experiences Scale; McAuley & Courneya, 1994) used to assess affect (Ekkekakis & Petruzzello, 2001). Second, measures of affect were collected after each experimental condition, which has been criticised on the basis that this measure will have obtained information on the participants' response *to* exercise rather than affect experienced *during* the activity (Ekkekakis & Brand, 2019). Finally, Swann et al. (2019) did not consider the potential for inter-individual differences (e.g., participants engaging in different levels of PA), which has been identified as a key issue in the affect literature (Ekkekakis & Brand, 2019). Therefore, further research that mitigates such limitations is warranted to advance understanding of the effect of goal type on affect, which is a key determinant underlying engagement in PA (Rhodes & Kates, 2015).

The Current Study

This research aims to extend recent work on the effect of goal type on psychological variables in PA by comparing the effect of SMART, open, and DYB goals on performance and psychological responses in active and insufficiently active adults in a walking task. The research builds on previous experimental work (Swann et al., 2019) by: sampling active and insufficiently active adults; adopting a between-conditions repeated measures design; and obtaining psychological measures both during and after PA. By doing so, this research responds to calls (Beauchamp et al., 2018; McEwan et al., 2016; Swann & Rosenbaum, 2018;

Swann et al., 2019) for further research into: (1) the effects of goal setting on psychological outcomes during PA; and (2) the examination of both active and insufficiently active participants. In turn, findings could inform applied recommendations for goal setting for the purpose of increasing PA.

Specifically, it was hypothesised (H_1) that SMART, open, and DYB goals would result in significantly greater distances on the walking task compared to a control condition (i.e., no goal) as recent research found that pursuing these goals led to significantly better performance than pursuing no goal (e.g., Swann et al. 2019). In relation to the examination of both active and insufficiently active participants, it was hypothesised (H_2) that distance walked would be significantly further in the SMART condition compared to the open and DYB goal conditions for active individuals. Conversely, we anticipated (H_3) that insufficiently active participants would achieve significantly shorter distances in the SMART condition compared to the open and DYB goal conditions. These predictions stem from research highlighting the potential mistranslation of SMART goals for the purposes of PA promotion, where it was acknowledged that goal setting theory proposes that specific/SMART goals may not be suitable for individuals at the early stages of learning a new, complex task (Swann & Rosenbaum, 2018). Finally, it was hypothesised (H_4) that SMART, open, and DYB goals would elicit higher levels of enjoyment compared to the control condition across the sample, given that recent research found greater enjoyment in conditions utilising SMART and open goals compared to a no-goal control condition (i.e., "walk at your normal pace" - Swann et al., 2019). Additionally, this study explored how goal types influence affect, felt arousal, perceived exertion, confidence, perceived performance, perceived challenge, and post-exercise perceptions, and sought to understand whether responses on these variables differed between active and insufficiently active individuals.

Method

Participants and Recruitment

Ethical approval was provided by a school ethics committee at a British university. Sample size was determined by a power analysis using G*Power 3 (Faul et al., 2007). Findings from a meta-analysis indicate that goal setting has a moderate effect (f = 0.40) on PA (McEwan et al., 2016). An a priori power analysis (repeated measures ANOVA, between factors) with a medium effect size (f = 0.40), an alpha level of .05, power of 0.8, and moderate correlation between repeated measures (r = .50), with two groups and four measurements resulted in a suggested sample size of 34.

Participants were recruited on a voluntarily basis via recruitment posters on a university campus and advertisement of the investigation via social media platforms and community networks. A purposive sampling strategy was employed whereby participants were eligible to take part if they: (a) were between the ages of 18 and 40 years; and (b) participated either in more than 150 minutes of moderate intensity PA per week, or less than 30 minutes of moderate intensity PA per week, following current recommendations for PA guidelines (NHS, 2019). To confirm PA levels, the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) was completed by participants. This questionnaire was used to verify the allocation of each participant into one of two study groups: (1) active (i.e., ≥ 150 minutes of moderate intensity PA per week) or (2) insufficiently active (i.e., ≤ 30 minutes of moderate intensity PA per week). In total, 38 participants were recruited, with two participants subsequently removed due to misinterpretation of the experimental instructions (i.e., participants did not follow the guidance provided for the test), resulting in a sample of 36 participants. A sample size above the power calculation was recruited to account for participant drop-out and potential exclusion from the analyses, and enable equal gender representation across groups.

Research Design

The study employed a 4 x 3 x 2 mixed design, combining repeated measures (condition and attempt) and between-group (active/insufficiently active group) variables. Participants visited a laboratory on four occasions and were exposed to all four goal conditions, which were: SMART; open; DYB; and control (see Goal conditions). In each session, participants completed three attempts of the 6-minute walk test (6MWT; Enright, 2003), following different goal instructions (i.e., goal condition). In all sessions, attempt one served as a baseline attempt (i.e., no goal), with the subsequent two attempts serving as the experimental conditions (i.e., SMART, open, or DYB goals depending on the condition). Three attempts were included in each condition to ensure parity between the conditions (i.e., participants completed the same number of attempts in each condition). To circumvent the potential for practice, learning, and boredom effects, a randomised, counterbalanced order was implemented.

Goal conditions. In the *control condition*, participants were instructed to "walk at a comfortable pace, that represents your typical walking activities" for all three 6MWT attempts. This instruction was also adopted for the first attempt in the remaining three conditions to establish baseline performance. For the experimental conditions, a different instruction was implemented for the second and third 6MWT attempts. Similar to Swann et al. (2019), participants were instructed to "see how far you can walk in six minutes" for the *open goal condition*. For the *SMART goal condition*, the distances for the participants' second and third attempts were determined by the results of their baseline attempt in each of the respective conditions. Accordingly, participants were instructed to "walk [baseline distance + 16.67%] in six minutes" for the second attempt, and to "walk [attempt two distance + 8.33%] in six minutes" for the third attempt, with these instructions based on previous research (Swann et al., 2019). Finally, to advance understanding of DYB goals, the *do-your-best goal condition* asked participants to "do your best in six minutes" in relation to distance.

Six-Minute Walking Test

The 6MWT is designed to measure the physical capacity of an individual to undertake daily activities and provides an objective measure of aerobic and functional capacity, which is determined by the distance walked in six minutes (Burr et al., 2011). In allowing the individual to select their own effort and intensity, this test is conducive to examining the effect of goal type on PA (Swann et al., 2019). Excellent test-retest reliability has been demonstrated for the 6MWT (intraclass correlation coefficient ≥ .90) in a range of adult populations (Demers et al., 2001; Hamilton & Haennel, 2000). To circumvent potential practice effects and knowledge transfer from one session to the next (e.g., counting laps), the participants completed a different course (dimension and distance) in each session.

Measures

Distance. The distance recorded for each 6MWT was determined by summing the number of laps, multiplying this by the total distance of the course design being used, and adding the extra distance of any partial laps that were completed. Participants carried a bean bag throughout the test, which they were instructed to drop at the end of the 6MWT. The distance of any partial laps was calculated by measuring from the last corner of the course passed by the participant to the position of the bean bag.

Affect. The Feeling Scale (FS; Hardy & Rejeski, 1989) was used to measure affect. The FS is frequently adopted for the measurement of affective responses during exercise (e.g. Ekkekakis & Petruzzello, 1999; Kwan & Bryan, 2010) and is effective for measuring inter-individual variability (Sudeck et al., 2016). The FS is a single-item, bipolar measure of pleasure-displeasure, which incorporates an 11-point scale ranging from +5 (*very good*) to -5 (*very bad*), with a midpoint 0 (*neutral*). Measures of affect were taken before, during (at minutes 2 and 4), and immediately after each 6MWT.

Arousal. The Felt Arousal Scale (FAS; Svebak & Murgatroyd, 1985) is a 6-point scale that ranges from 1 (*low arousal*) to 6 (*high arousal*). Measures of arousal were taken before, during (at minutes 2 and 4), and immediately after each 6MWT. The FAS has demonstrated convergent validity and correlations (r = .45 - .70) with other measures of perceived activation in PA research (Van Landuyt et al., 2000).

Perceived exertion. The Rating of Perceived Exertion (RPE) Scale (Borg, 1998) was used to assess perceptions of effort throughout each 6MWT. The RPE scale ranges from 6 (*no exertion at all*) to 20 (*maximal exertion*) and was used to measure perceptions of exertion before, during (at minutes 2 and 4), and immediately after each 6MWT. This measure has been found to be a valid and reliable for measure of exercise intensity in healthy adults (e.g., Chen et al., 2002).

Heart rate. Heart rate was measured using Polar RS400 Heart Rate Monitors with a chest strap and wrist watch worn throughout the entirety of each condition. Resting heart rate was established prior to the walking task. Heart rate during walking was calculated by averaging the 2-minute interval data from the 6MWT.

Confidence. Similar to Schweickle et al. (2017), a single item was used to assess confidence. After each 6MWT attempt, participants were asked to indicate their level of confidence in meeting the prescribed goal for the 6MWT that had just been completed, by responding on a scale ranging from 1 (*not at all confident*) to 10 (*totally confident*).

Perceived performance. In line with previous research (Schweickle et al., 2017), a single-item measure was used to assess subjective perceptions of performance based on the prescribed goal. Immediately after each 6MWT, participants indicated on a scale ranging from 1 (*like I performed extremely badly*) to 10 (*like I performed extremely well*) how well they thought they had performed in the test.

Perceived challenge. A single-item measure was used to assess the subjective perceptions of challenge similar to Schweickle et al. (2017). This measure assessed how challenging each participant perceived the 6MWT was in relation to the instructions given. Immediately after each 6MWT, participants responded on a scale ranging from 1 (*not at all challenged*) to 10 (*much too challenged*).

Enjoyment. The Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991) was adopted as a measure of enjoyment. The PACES is a single factor, multiple-item scale that consists of 18 bipolar statements scored on a 7-point continuum (e.g., "*I enjoyed it"* [1] – "*I hated it*" [7]). The PACES was used to identify participant's feelings and experience for each condition (i.e., after all three attempts). The PACES has demonstrated acceptable internal consistencies and test-retest reliability (intraclass correlation coefficient = .93) as a measure of enjoyment of PA in adults (e.g., Kendzierski & DeCarlo, 1991). Internal inconsistency was found to be excellent in the current study (α = .93).

Post-exercise perceptions. Participants were asked to respond to three questions evaluating their post-exercise perceptions. At the end of each session, participants were asked: (1) "*how motivated do you feel to exercise following this experience?*"; (2) "*how confident do you feel in exercising following this experience?*"; and (3) "*how likely would you be to engage in exercise again following this experience*?". Responses were on a scale of 0 (*not at all*) to 10 (*very much*), with a midpoint at 5 (*somewhat*).

Manipulation check. A manipulation check was implemented to reduce the possibility that results could be attributable to spontaneous goal setting (cf. Boyce, 1994) or failure to respond to the prescribed goal. After each attempt, participants responded to the question: "To what extent did you follow the goal that you were given?" on a 10-point Likert scale that ranged from 1 (*not at all*) to 10 (*very much*), with a midpoint of 5 (*somewhat*). Participants were to be excluded from the analyses if they reported a five or below in any attempt. No participants failed the manipulation check. Similar to Swann et al. (2019), participants also rated whether the SMART goal they were given was achievable, realistic, and challenging on a scale that ranged from 0 (*not at all*) to 10 (*very much*), with a midpoint of 5 (*somewhat*), to ensure that the assigned goals were in line with SMART principles.

Procedure

Participants signed an informed consent sheet and completed the Physical Activity Readiness Questionnaire (PAR-Q; Thomas et al., 1992) prior to commencing the study and subsequently attended a laboratory on four occasions at their convenience (*M* length between each session = 4.18 days, *SD* = 0.45), with each visit lasting approximately one hour (Figure 1; see Supplementary File 1 for study protocol). Prior to commencing each session, participants were allowed a period of rest (approximately five minutes) to establish a resting heart rate. All participants subsequently completed three attempts of the 6MWT in each visit. Following each attempt, the participants were allowed a 6-minute seated rest period (i.e., equal work-to-rest ratio) to allow restoration of their resting heart rate. During each rest period, participants were asked to respond to four, single-item measures: goal manipulation check; confidence; perceived performance; and perceived challenge. In the SMART goal condition, additional measures were taken to determine how achievable, realistic, and challenging the goal was perceived to be. Measures of RPE, affect, and arousal were taken at 2-minute intervals during each 6MWT, with the PACES and three single item questions related to post-exercise perceptions taken at the end of each session. Single-item measures were used to facilitate comparison to literature investigating open goals (e.g., Schweickle et al., 2017; Swann et al., 2019).

Data Analysis

Data were analysed using IBM SPSS 22. Prior to analysis, preliminary inspection of the data was conducted to assess whether the data were normally distributed. A series of 4 (goal condition) x 3 (attempt) x 2 (group) mixed ANOVAs were conducted for measures assessed between groups (RPE, affect, arousal, confidence, perceived performance, perceived challenge, and distance), with mean scores calculated for variables collected at multiple time points (baseline, two, four, and six minutes). A series of 2 (group) x 4 (conditions) mixed ANOVAs were conducted for each of the dependant variables that were only obtained at the end of each session (i.e., PACES and post-exercise perceptions). Greenhouse-Geisser estimates of sphericity were used in instances where Mauchly's test indicated a violation. Whilst a Bonferroni-corrected alpha is often recommended for multiple comparisons, this correction incurs substantially decreased statistical power and an increased probability of a Type II error (Nakagawa, 2004). Given that this research was exploratory, and that research on open goals is at a very early stage, a standard alpha (set at .05 for all statistical tests) was maintained with effect sizes used as the main criteria for data interpretation (Armstrong, 2014). Effect sizes (Cohen's *d*; Cohen, 1988) were calculated for significant differences using Comprehensive Meta-Analysis (Version 3; Borenstein, Hedges, Higgins, & Rothstein, 2015). Effect sizes were interpreted as: small (0.2); medium (0.5); and large (0.8). To determine whether the effects of goal types on distance walked were mediated by the in-task measures (i.e., affect, arousal, RPE) across the entire sample, the MEMORE 2.1 (Montoya & Hayes, 2017) SPSS macro (model 1) was used to examine these within-participant mediation paths. Indirect effects were based on bias-corrected confidence intervals derived from 5000 bootstrap samples, which were significant when the confidence interval did not span zero. Distance walked in the control condition was paired with the distance walked in the SMART, open, and DYB conditions as the outcome variables in three separate mediation models, while the respective values for RPE, affect, and arousal were entered as the mediating variables.

Results

Participant characteristics are presented in Table 1. Within the male and female subgroups, there were no significant differences in age between active and insufficiently active participants. A significant difference ($p < .05$), however, was evident in body mass index (BMI) between active and insufficiently active participants in each of the male and female subgroups, with significantly higher BMI identified in insufficiently active participants. Findings are presented in the following sections in terms of: distance; in-task measures; post-attempt measures; and post-condition measures (Table 1; see Supplementary File 2). The results obtained from the goal manipulation check demonstrated that for attempt 2 in the SMART condition, participants reported the assigned goal to be achievable (M = 7.77, SD = 1.37), realistic (M = 8.08, SD = 1.29), and appropriately challenging (M = 5.77, SD = 1.37), with 31 participants (86.11%) achieving the goal. In attempt 3, results also indicated that the SMART goal was achievable (M = 7.36, SD = 1.08), realistic (M = 6.97, SD = 1.30) and appropriately challenging (M = 7.27, SD = 1.48), with 29 participants (80.55%) achieving the goal. No significant differences were found in goal achievement, or for how achievable, realistic, or challenging the assigned goals were between active and insufficiently active participants.

[INSERT TABLE 1 ABOUT HERE]

[INSERT TABLE 2 ABOUT HERE]

Distance

A significant main effect of attempt x distance achieved was found, F (1.40, 47.70) = 274.20, $p < .001$, $\eta_p^2 = .89$. The distance achieved by participants significantly increased ($p < .001$) from: attempt 1 to 2; attempt 1 to 3; attempt 2 to 3. The main effect for condition on distance achieved was significant across the sample, F (2.30, 78.30) = 82.32, $p < .001$, $\eta_p^2 =$ .70; $\varepsilon = .666$, with significantly greater distances walked in the SMART, open, and DYB conditions compared to the control condition ($p < .001$), but no significant differences were found between the SMART, open, or DYB conditions. There was also a significant main effect of attempt on distance achieved, F (1.40, 47.70) = 274.20, $p < .001$, $\eta_p^2 = .89$. The distance achieved by participants significantly increased ($p < .001$) from: attempt 1 to 2; attempt 1 to 3; attempt 2 to 3.

There was no significant group x attempt interaction, F (1.40, 47.70) = 2.63, $p > .05$, $\eta_p^2 = .07$. However, there was a significant group x condition interaction, F (2.30, 78.30) = 7.48, $p < .001$, $\eta_p^2 = .18$, with significant differences found between the SMART and open goal conditions ($p < .001$). Specifically, active participants achieved greater distances in the SMART condition compared to the open goal condition ($M_{diff} \pm SE$; 34.24 ± 5.94; CI: 16.51, 51.98; $p < .001$; Cohen's $d = 0.86$), while insufficiently active participants achieved greater distances in the open condition compared to the SMART condition ($M_{diff} \pm SE$; -17.44 ± 5.04; CI: -32.47, -2.40; $p < .05$; Cohen's $d = 0.47$). The group x condition x attempt interaction was significant across the sample, F (3.90, 135.90) = 3.21, $p < .05$, $\eta_p^2 = .86$. A significant difference was found between groups at attempt 2 ($M_{diff} \pm SE$; 36.89 ± 15.27; CI: 67.94, 5.84; $p < .05$; Cohen's $d = 0.80$) and 3 ($M_{diff} \pm SE$; 50.03 ± 19.51; CI: 89.67, 10.38; $p < .05$; Cohen's $d = 0.85$) in the open goal condition, with insufficiently active participants achieving significantly greater distances in the open goal condition compared to the active group. No significant differences were found between groups in the SMART, DYB, or control conditions for either attempt 2 or 3.

In-Task Measures

Affect. There was a significant main effect of condition on affect, F (2.52, 87.60) = 15.88, $p < .001$, $\eta_p^2 = .32$; $\varepsilon = .62$, with pairwise comparisons showing greater feelings of pleasure in the SMART, open, and DYB condition compared to the control condition ($p < .001$). No significant differences were found between the SMART, open, or DYB conditions.

There was no significant main effect of the attempt on pleasure-displeasure, F (1.22, 43.40) = 1.38, p <.001, $\eta_p^2 = .04$.

No significant group x attempt interaction, F (1.22, 43.50) = 0.26, $p > .05$, $\eta_p^2 = .01$, was found. There was a significant group x condition interaction, F (2.52, 87.60) = 8.11, $p < .001$, $\eta_p^2 = .19$. The active group experienced significantly higher feelings of pleasure in the SMART ($M_{\text{diff}} \pm SE$; 0.82 ± 0.21; CI: 0.21, 1.44; $p < .05$; Cohen's d = 0.65), open ($M_{\text{diff}} \pm SE$; 0.61 ± 0.20; CI: 0.02, 1.21; $p < .05$; Cohen's d = 0.50), and DYB ($M_{\text{diff}} \pm SE$; 0.44 ± 0.14; CI: 0.01, 0.87; $p < .05$; Cohen's d = 0.33) goal conditions compared to the control condition, but no significant differences were reported between the SMART, open, and DYB conditions. However, the insufficiently active group reported significantly higher feelings of pleasure in the open ($M_{\text{diff}} \pm SE$; 1.14 ± 0.26; CI: 0.38, 1.91; $p < .05$; Cohen's d = 1.25) and DYB ($M_{\text{diff}} \pm SE$; 1.12 ± 0.16; CI: 0.64, 1.60; $p < .001$; Cohen's d = 1.26) conditions compared to the control condition. Although no significant differences were found between conditions in the active group, a significant difference was found between groups in the open and the SMART conditions, with insufficiently active participants reporting significantly lower levels of pleasure in the SMART condition compared to the active group ($M_{\text{diff}} \pm SE$; -0.88 ± 0.21; CI: -0.25, -1.50; $p < .05$; Cohen's d = -0.94). Furthermore, there was no significant difference in pleasure between SMART and control conditions in the insufficiently active group, whereas the SMART condition was significantly greater than the control condition in the active group ($M_{\text{diff}} \pm SE$; 0.82 ± 0.20; CI: 0.21, 1.44; $p < .001$; Cohen's d = 0.65). The group x condition x attempt interaction was significant, F (3.70, 126.04) = 7.36, $p < .001$, $\eta_p^2 = .18$. No significant differences were found between the groups at attempt 2 in the SMART, open, DYB, or control conditions. Similarly, no significant difference was found at attempt 3 in the open, DYB, or control conditions. There was, however, a large, significant difference between groups in the SMART condition ($M_{\text{diff}} \pm SE$; 1.49 ± 0.45; CI: 0.56, 2.41; $p < .05$;

Cohen's d = 1.09), with insufficiently active participants reporting significantly lower feelings of pleasure than active participants.

Arousal. A significant main effect of the condition on arousal was found, F (2.70, 91.98) = 35.96, $p < .001$, $\eta_p^2 = .51$, $\varepsilon = .707$, with significantly higher arousal scores in the SMART, open, and DYB conditions when compared to the control condition ($p < .001$), but there were no significant differences between the SMART, open, and DYB conditions. There was a significant main effect of the attempt, F (1.30, 42.80) = 34.55, $p < .001$, $\eta_p^2 = .50$, with pairwise comparisons indicating a significant difference ($p < .05$) between: attempt 1 and 2; 1 and 3; and 2 and 3, where arousal was higher in each subsequent attempt.

No significant group x attempt interaction was found, F (1.20, 42.80) = 1.36, $p > .05$, $\eta_p^2 = .04$. A non-significant group x condition interaction was also found, F (2.70, 91.98) = 2.63, $p > .05$, $\eta_p^2 = .07$. However, the group x condition x attempt interaction was significant, F (4.20, 144.20) = 3.19, $p < .05$, $\eta_p^2 = .09$. Simple effects analysis indicated a significant difference between groups at attempt 2 ($M_{\text{diff}} \pm SE$; 0.85 ± 0.32; CI: 1.50, 0.19; $p < .05$; Cohen's d = 0.87) and attempt 3 ($M_{\text{diff}} \pm SE$; 1.08 ± 0.39; CI: 1.87, 0.29; $p < .05$; Cohen's d = 0.94) in the open condition, and at attempt 2 ($M_{\text{diff}} \pm SE$; 0.69 ± 0.28; CI: 1.26, 0.13; $p < .05$; Cohen's d = 0.84) and attempt 3 ($M_{\text{diff}} \pm SE$; 1.04 ± 0.38; CI: 1.81, 0.27; $p < .05$; Cohen's d = 0.92) in the DYB condition, with insufficiently active participants reporting significantly higher levels of arousal in these conditions compared to active participants.

Perceived exertion. The main effect of condition on RPE was significant, F (2.60, 89.84) = 50.14, $p < .001$, $\eta_p^2 = .59$, $\varepsilon = .728$, with participants reporting significantly higher RPE in the SMART, open, and DYB conditions compared to the control condition ($p < .001$), but there were no differences between the SMART, open, and DYB conditions. A significant main effect of attempt on RPE, F (1.20, 43.20) = 154.64, $p < .001$, $\eta_p^2 = .82$, identified that participants' RPE significantly increased ($p < .001$) from: attempt 1 to 2; attempt 1 to 3; attempt 2 to 3.

There was no significant group x condition interaction, F (2.60, 89.84) = 1.58, $p >$ .05, $\eta_p^2 = .04$. There was a significant group x attempt interaction on RPE, F (1.20, 43.10) = 10.49, $p < .001$, $\eta_p^2 = .24$, where both active and insufficiently active participants reported significant increases in RPE ($p < .05$) from: attempt 1 and 2; attempt 1 and 3; attempt 2 and 3. Active participants reported significantly greater RPE during: attempt 2 relative to attempt 1 ($M_{\mathrm{diff}} \pm SE$; 1.08 ± 0.11; CI: 0.80, 1.37; $p < .001$; Cohen's d = 2.40); attempt 3 compared to attempt 1 ($M_{\mathrm{diff}} \pm SE$; 1.49 ± 0.17; CI: 1.04, 1.94; $p < .001$; Cohen's d = 2.59); and attempt 3 versus attempt 2 ($M_{\mathrm{diff}} \pm SE$; 0.41 ± 0.12; CI: 0.09, 0.72; $p < .05$; Cohen's d = 0.66). Insufficiently active participants reported significantly greater RPE during: attempt 2 compared to attempt 1 ($M_{\mathrm{diff}} \pm SE$; 1.89 ± 0.17; CI: 1.44, 2.35; $p < .001$; Cohen's d = 1.36); attempt 3 relative to attempt 1 ($M_{\mathrm{diff}} \pm SE$; 2.52 ± 0.27; CI: 1.82, 3.23; $p < .001$; Cohen's d = 1.73); and attempt 3 versus attempt 2 ($M_{\mathrm{diff}} \pm SE$; 0.63 ± 0.12; CI: 0.29, 0.96; $p < .001$; Cohen's d = 0.40). A non-significant group x condition x attempt interaction was found across the sample, F (4.30, 148.50) = 2.25, $p > .05$, $\eta_p^2 = .06$.

Indirect Effects on Distance

Results of the mediation analysis are presented in Table 2. No significant indirect effect of any goal type on distance achieved via affect or arousal compared to the control condition was found. However, in comparison to the control condition, the indirect effect of the SMART, open, and DYB goal conditions on distance walked was significantly mediated by RPE ($p < .05$).

[INSERT TABLE 3 ABOUT HERE]

Post-Attempt Measures

Perceived confidence. There was a significant main effect of condition on perceived confidence, F (2.10, 73.79) = 14.30, $p < .001$, $\eta_p^2 = .29$; $\varepsilon = .571$, with significantly ($p < .05$) higher levels of perceived confidence in the open and DYB condition compared to the SMART condition. There was a significant main effect of attempt on perceived confidence, F (1.60, 56.74) = 22.22, $p < .001$, $\eta_p^2 = .39$, with significant increases in confidence found from: attempt 1 and 2; attempt 1 and 3; but no significant differences between attempt 2 and 3.

The group x condition interaction was significant, F (2.10, 73.79) = 16.52, $p = < .001$, $\eta_p^2 = .33$. The active group reported no significantly different perceptions of confidence in any of the goal conditions. However, the insufficiently active group reported significantly higher perceptions of confidence in the open ($M_{\text{diff}} \pm SE$; 1.76 ± 0.27; CI: 0.96, 2.56; $p < .001$; Cohen's d = 1.60) and DYB ($M_{\text{diff}} \pm SE$; 1.82 ± 0.29; CI: 0.96, 2.67; $p < .001$; Cohen's d = 1.42) conditions compared to the SMART condition. No significant group x attempt interaction was found, F (1.60, 56.74) = .046, $p > .05$, $\eta_p^2 = .01$. The group x condition x attempt interaction was significant across the entire sample, F (3.40, 116.40) = 3.47, $p < .05$, $\eta_p^2 = .09$. Large, significant differences were found between groups across all three experimental conditions, with active participants reporting higher perceptions of confidence in the: SMART ($M_{\text{diff}} \pm SE$; 1.89 ± 0.55; CI: 0.77, 3.01; $p < .05$; Cohen's d = 1.14); DYB ($M_{\text{diff}} \pm SE$; 1.06 ± 0.41; CI: 0.22, 1.89; $p < .05$; Cohen's d = 0.85); and control ($M_{\text{diff}} \pm SE$; 1.50 ± 0.61; CI: 0.25, 2.75; $p < .05$; Cohen's d = 0.81) conditions. At attempt 3, there was also a large, significant difference between groups in the SMART ($M_{\text{diff}} \pm SE$; 2.50 ± 0.71; CI: 1.05, 3.95; $p < .001$; Cohen's d = 1.17) and control ($M_{\text{diff}} \pm SE$; 1.78 ± 0.64; CI: 0.47, 3.09; $p < .05$; Cohen's d = 0.92) conditions, with active participants reporting higher perceptions of confidence in these conditions compared to the insufficiently active group.

Perceived performance. A significant main effect of condition was found, F (2.10, 72.20) = 6.63, p = .002, η_p^2 = .16; ε = .626, with significant differences found between the SMART and open conditions, and the SMART and DYB conditions. There was also a significant main effect of attempt, F (1.40, 47.73) = 5.42, p < .05, η_p^2 = .14, with significant increases in perceptions of performance (p < .05) from attempt 1 to 3, but no significant difference between attempt 1 and 2, or attempt 2 and 3.

The group x condition interaction was significant, F (2.10, 72.20) = 3.21, p < .05, η_p^2 = .09, with the active group reporting no significant differences between any of the conditions, but significantly higher perceptions of performance were found in the open (M_{diff} ± SE; 1.52 ± 0.24; CI: 0.80, 2.23; p < .001; Cohen's d = 1.53) and DYB (M_{diff} ± SE; 1.54 ± 0.26; CI: 0.76, 2.32; p < .001; Cohen's d = 1.22) conditions compared to the SMART condition for the insufficiently active group. No significant group x attempt interaction was found, F (1.40, 47.73) = .51, p > .05, η_p^2 = .02. A significant group x condition x attempt interaction was found for perceived performance, F (3.70, 127.7) = 3.85, p = .006, η_p^2 = .102. For both attempt 2 (M_{diff} ± SE; -1.78 ± 0.51; CI: -0.74, -2.82; p < .001; Cohen's d = 1.16) and attempt 3 (M_{diff} ± SE; -2.33 ± 0.61; CI: -1.10, -3.56; p < .001; Cohen's d = 1.30) insufficiently active participants reported significantly lower perceptions of performance in the SMART condition compared to the active group. No significant differences were found at attempt 2 or 3 in the: open; DYB; or control conditions.

Perceived challenge. There was a significant main effect of condition on perceived challenge, F (2.60, 91.34) = 36.89, p < .001, η_p^2 = .520, ε = .167, with significant differences (p < .05) in perceived challenge in the SMART, open, and DYB conditions compared to the control condition, and a significantly higher perception of challenge in the SMART condition compared to the open condition (p < .05). A significant main effect of attempt was found, F

(1.40, 49.11) = 273.20, $p < .001$, $\eta_p^2 = .89$, where perceptions of challenge increased from: attempt 1 to attempt 2; attempt 1 to attempt 3; and attempt 2 to attempt 3.

There was no significant group x condition interaction, F (2.60, 91.34) = 1.32, $p > .05$, $\eta_p^2 = .04$, and no significant group x attempt interaction, F (1.40, 49.11) = 3.35, $p > .05$, $\eta_p^2 = .09$. The group x condition x attempt interaction was also not significant, F (3.70, 127.92) = .575, $p > .05$, $\eta_p^2 = .02$.

Post-Condition Measures

Enjoyment. The level of enjoyment was significantly affected by goal condition, F (2.10, 72.70) = 16.59, $p < .001$, $\eta_p^2 = .33$, $\varepsilon = .713$. Pairwise comparisons indicated that participants experienced significantly higher enjoyment ($p < .001$) after the SMART, open, and DYB conditions compared to the control condition, but no significant differences were found between the SMART, open, or DYB conditions.

There was a significant group x condition interaction effect, F (2.10, 72.70) = 10.79, $p < .001$, $\eta_p^2 = .241$. Active participants reported significantly higher levels of enjoyment ($p < .05$) after the SMART compared to the insufficiently active group ($M_{\text{diff}} \pm SE$; 14.11 ± 5.67; CI: 2.59, 25.63; $p < .05$; Cohen's d = 0.83), and the insufficiently active participants reported significantly higher levels of enjoyment after the open condition ($M_{\text{diff}} \pm SE$; 17.68 ± 5.65; CI: 6.18, 29.16; $p < .05$; Cohen's d = 1.04) compared to the active group.

Motivation to exercise. Goal condition had a significant effect on motivation to exercise, F (3.00, 102.00) = 6.14, $p < .001$, $\eta_p^2 = .15$, with pairwise comparisons indicating significantly higher motivation to exercise ($p < .05$) after the open and DYB conditions compared to the control condition. No significant differences were found between the SMART, open, or DYB conditions, or between the SMART and control conditions.

A significant group x condition interaction effect was found, F (3.00, 102.00) = 10.04, $p < .001$, $\eta_p^2 = .23$. Active participants reported significantly higher motivation to exercise after the SMART ($M_{\text{diff}} \pm SE$; 2.28 ± 0.48; CI: 1.30, 3.26; $p < .001$; Cohen's $d = 1.57$) and control conditions ($M_{\text{diff}} \pm SE$; 1.61 ± 0.61; CI: 0.37, 2.85; $p < .05$; Cohen's $d = 0.88$) compared to the insufficiently active group.

Confidence in exercising. Confidence in exercising was significantly influenced by goal condition, F (2.30, 79.62) = 10.83, $p < .001$, $\eta_p^2 = .24$; $\varepsilon = .781$. Significantly higher ($p < .05$) confidence in exercising was found after the open and DYB conditions compared to the control condition. Significantly higher perceptions of confidence ($p < .05$) were also reported after the open, DYB and control conditions compared to the SMART condition.

There was a significant group x condition interaction, F (2.30, 79.62) = 8.83, $p < .001$, $\eta_p^2 = .21$. Large significant differences were found between groups, with active participants reporting higher confidence in exercising after the: SMART ($M_{\text{diff}} \pm SE$; 3.33 ± 0.64; CI: 2.03, 4.63; $p < .001$; Cohen's $d = 1.73$); open ($M_{\text{diff}} \pm SE$; 0.94 ± 0.35; CI: 0.24, 1.65; $p < .05$; Cohen's $d = 0.92$); DYB ($M_{\text{diff}} \pm SE$; 1.33 ± 0.36; CI: 0.61, 2.06; $p < .001$; Cohen's $d = 1.25$); and control condition ($M_{\text{diff}} \pm SE$; 2.72 ± 0.52; CI: 1.67, 3.77; $p < .001$; Cohen's $d = 1.76$) between active and insufficiently active participants, where active participants reported higher confidence in exercising after all conditions compared to the insufficiently active group.

Intentions to exercise. Intentions to exercise were significantly affected by goal condition, F (2.04, 69.45) = 13.59, $p < .001$, $\eta_p^2 = .29$; $\varepsilon = .681$, with significantly higher ($p < .05$) intentions to exercise after the open and DYB conditions compared to the control condition, and higher intentions in the open condition compared to the SMART condition.

The group x condition interaction was significant, F (2.04, 69.45) = 10.96, $p < .001$, $\eta_p^2 = .24$. Large, significant differences were found in the SMART ($M_{\text{diff}} \pm SE$; 3.06 ± 0.60; CI: 1.84, 4.28; $p < .001$; Cohen's $d = 1.70$), open ($M_{\text{diff}} \pm SE$; 0.78 ± 0.28; CI: 0.22, 1.34; $p < .05$; Cohen's $d = 0.93$), and control conditions ($M_{\text{diff}} \pm SE$; 2.56 ± 0.64; CI: 1.26, 3.86; $p <$

.001; Cohen's d = 1.33) between active and insufficiently active participants, with active participants reporting greater intentions to exercise after all conditions.

Discussion

This study aimed to examine the effect of SMART, open, and DYB goals on performance and a variety of psychological outcomes across active and insufficiently active participants in a walking task. In extending the method employed by Swann et al. (2019) by using a between-conditions repeated measures design, taking in-task and post-task measures, and sampling both active and insufficiently active participants, this study sought to explore how each subgroup responded psychologically to the different goal types employed. Findings extend the evidence base on goal setting in PA by providing further evidence of the effects of SMART, open, and DYB goals when utilised by active and insufficiently active participants.

The first hypothesis, that SMART, open, and DYB goals would result in greater distances on the walking task compared to a control condition, was supported. As such, findings in the current study align with previous research (McEwan et al., 2016; Swann et al., 2019) by demonstrating that goal setting produces more PA compared to not being prescribed a goal (i.e., being instructed to walk at normal pace). Furthermore, the indirect path from each goal to distance walked was significantly mediated by RPE, but the indirect effect via affect and arousal was not significant. The identification of RPE as a potential mechanism for the effect of goals on distance walked in the current study concurs with the proposition that goals enhance performance by leading to greater effort in a task (Locke & Latham, 2013). While findings from the current study provide initial insights into the potential mechanisms underlying the goal-performance relationship in the context of SMART, open, and DYB goals, some caution should be taking when interpreting these findings as power testing was not conducted for the mediation analyses. Therefore, future research using appropriately powered mediation analyses is warranted to examine the mechanisms underpinning the effects of SMART, open, and DYB goals on the amount of PA completed.

The second and third hypotheses, that active participants would achieve greater distances in the SMART condition compared to open and DYB goal conditions, and that insufficiently active participants would conversely achieve lower distances in the SMART condition compared to open and DYB goals, were partially supported. Specifically, active participants walked significantly further in the SMART compared to the open goal condition, while insufficiently active participants walked significantly further in the open goal compared to the SMART goal condition. Given that insufficiently active participants performed less favourably when prescribed a SMART goal, findings from the current study support theoretical predictions in goal setting theory (Latham & Locke, 1991), which suggests that specific, challenging performance goals may be problematic for individuals in the early stages of engagement in an activity. In doing so, current findings support the supposition that "vaguer" goals might be more suitable for individuals in the early stages of learning (McEwan et al., 2016).

While Swann et al. (2019) found initial evidence for the efficacy of open goals in PA, findings from exploratory analyses undertaken in the present study advance this knowledge by suggesting that open goals may be more effective than SMART goals for insufficiently active individuals, whereas open goals might not be as effective as SMART goals for active participants. In turn, these findings provide support for concerns raised about the suitability of prescribing SMART goals for the purpose of PA promotion to all population groups (Swann & Rosenbaum, 2018) and further evidence for the potential utility of open goals for engaging insufficiently active individuals in PA. However, it should be noted that a meta-analysis primarily involving insufficiently active adults demonstrated a similar effect of specific and vague goals on PA (McEwan et al., 2016). Thus, further research is required to investigate whether the effects found in this single-session study are replicated in insufficiently active individuals over a longer time period.

The final hypothesis, that SMART and open goals would elicit higher levels of enjoyment compared to the control condition, was supported. In turn, findings from the current study partially replicate previous research, which found greater levels of enjoyment in SMART and open goal conditions when compared to a control condition (Swann et al., 2019). However, the present study extends this understanding by identifying distinct responses to SMART and open goals between active and insufficiently active groups. Specifically, active participants reported significantly greater enjoyment in the SMART goal condition, while insufficiently active participants reported significantly more enjoyment in the open goal condition. The identification of differences in enjoyment between active and insufficiently active participants in response to SMART and open goals is important as enjoyment is regarded as a predictor of future PA (e.g., Kwan & Bryan, 2010). Thus, findings from the current study suggest that goals should be tailored to an individual's PA level (i.e., active or insufficiently active) to optimise the level of enjoyment experienced in PA, which could subsequently have a positive impact on their long-term engagement in the activity.

The current study extends understanding of the effects of SMART, open, and DYB goals on affect during exercise by capturing in-task measures (as opposed to recalled affect *after* walking tests in Swann et al., 2019). A noteworthy finding from the exploratory analyses was that insufficiently active participants reported the open and DYB conditions to be significantly more pleasurable compared to the SMART goal condition. In other words, SMART goals led to lower levels of pleasure during exercise in insufficiently active participants than open or DYB goals. This finding is important given that affective responses during exercise strongly predict future PA participation (Rhodes & Kates, 2015). On the basis that SMART goals produced less pleasurable experiences than open or DYB goals in insufficiently active adults, findings of the current study raise substantive questions about the efficacy of prescribing PA based on SMART goals to all populations, which is current practice for many national organisations (e.g., ACSM, 2017; NHS, 2019). Additionally, insufficiently active participants reported significantly higher perceptions of performance (i.e., distance walked) and confidence in the open condition, as well as significantly higher levels of challenge in the SMART condition. Given that perceived performance is linked to self-efficacy, a known predictor of long-term PA (e.g., McAuley et al., 2007), this finding further substantiates the potential benefits of using open goals to promote PA in insufficiently active adults.

Finally, these goal conditions led to differences between active and insufficiently active individuals in perceptions of: motivation to exercise; confidence in exercising; and future exercise intentions. Active participants reported significantly higher motivation to exercise in the SMART goal condition when compared to the insufficiently active group, who reported significantly lower levels of motivation to exercise in the SMART condition. Further, active participants reported significantly higher confidence and intentions to exercise than the insufficiently active group after all four goal conditions. While Swann et al. (2019) found significantly higher interest in repeating the session for participants in the open goal group compared to the SMART goal group, this difference was not found in the present study. This finding is potentially a result of the between-conditions repeated measures design implemented in the present study, and the examination of active versus insufficiently active subgroups~~.~~

Taken together, findings in the current study build on previous work (Swann et al., 2019) by providing further evidence that open goals may be more psychologically adaptive than SMART goals in PA whilst still producing similar levels of PA. Moreover, by identifying significant experiential differences between active and insufficiently active participants in response to SMART goals, the current study provides empirical evidence to support concerns with the suitability of prescribing SMART goals for insufficiently active adults to increase PA levels (Swann & Rosenbaum, 2018). By doing so, the current study also raises doubt with the reliance on “one-size-fits-all" approaches to setting goals (i.e., based on SMART goals), which are commonly used in national PA guidelines (e.g., ACSM, 2017; NHS, 2019). This contention is important in the context of a recent critical conceptual review of the application of goal setting theory for PA promotion (Swann et al., in press, Health Psychology Review), which postulated that specific performance goals (e.g., SMART goals) may actually be detrimental to insufficiently active individuals’ attempts to increase PA. Indeed, evidence in the current study supports the view that there is a need to reconsider how goal setting principles are applied to initiatives seeking to promote PA, particularly in insufficiently active participants (Swann et al., in press, Health Psychology Review). An important implication of the current study is that there appears to warrant a move away from universal approaches to prescribing goals for the purpose of PA promotion and to shift towards implementing goals in a more tailored and dynamic manner, with an individual's current stage of PA development considered as a key moderator. Thus, while it would appear that current goal setting practices might be appropriate for active individuals, open goals could offer a promising alternative to PA promotion for those in the early stages of becoming physically active and should be considered in future PA initiatives.

Limitations and Future Research Directions

While this study provides novel understanding on the effect of open, DYB, and SMART goals on psychological outcomes in active and insufficiently active populations, a number of limitations are noteworthy. First, the 6MWT may limit the generalisability of these findings and multiple iterations of the same testing protocol may have resulted in practice or learning effects having potentially played a role in the results obtained. Second, perceptions of task complexity were not assessed, which raises uncertainty as to whether or not the task was perceived as complex for both groups, which is an important consideration according to goal setting theory (e.g., Latham & Locke, 1991). Third, the percentage increases for the SMART condition were adopted from previous research in healthy adults (Swann et al., 2019), which raises potential questions as to the comparability of the SMART condition to the open, DYB, and control condition. Participants in the SMART condition were set different percentages for attempts two and three, whereas open, DYB, and control conditions experienced consistent goal instructions for attempt two and three. This difference could have resulted in differing motivational responses in the goal conditions. Finally, it is important to note that the present study did not take into consideration the period of time that participants had been insufficiently active for prior to the study. Therefore, it is possible that participants classified as insufficiently active were previously active at some point in their lives and therefore may have had differing responses to goal types.

There are also a number of avenues for future research. First, researchers should explore alternative testing protocols that may be more applicable to a range of population groups to allow more generalisable findings (e.g., longer duration or higher intensity). Second, subsequent investigations should undertake pilot testing to ensure that prescribed SMART goals are applicable to both active and insufficiently active participants and are set at an appropriate level for each participant. Third, future studies should also seek to assess the level of task complexity to enable further critical testing of goal setting theory. Given that the current study employed a structured, lab-based PA session, which arguably consisted of a simple PA task (i.e., walking around a course in a laboratory for short periods), further investigations could address other key aspects of Drach-Zahavy and Erez's (2002) categorisation of task complexity by requiring participants to address specific component, coordinating, or dynamic complexity aspects of a task. Such an investigation could involve a participant being asked to: determine their own task frequency, intensity, duration, mode, and cost (i.e., component complexity); schedule, organise, and prioritise their own PA (i.e., coordinating complexity); and/or overcome difficulties (i.e., dynamic complexity). Fourth, researchers should determine the long-term effects of goal type on PA engagement to determine the utility of open goals in applied practice. Finally, research is warranted to explicitly test the core tenets of goal setting theory (Locke & Latham, 2013), which could include a comparison of specific, challenging performance goals, learning goals, and DYB goals in relation to and open goals.

Conclusion

This research supports initial empirical evidence surrounding the use of open goals (Swann et al., 2019) and has potential implications for the application of goal setting practice. Findings largely support theoretical predictions that specific, challenging performance goals are problematic when an individual is at the early stages of learning a complex task (Latham & Locke, 2013). Indeed, this research suggests that SMART goals are beneficial for physically active individuals, but indicate that open goals may be a more advantageous approach during the early stages of engaging in PA. Results from our exploratory analyses showed that when compared to SMART goals, open goals elicited more positive psychological responses on variables which are known to be predictive of future PA. Therefore, this research provides further evidence for the efficacy of open goals as an alternative approach for PA promotion, particularly in insufficiently active individuals.

Acknowledgements

The authors would like to thank Dr Adam Coussens for his insightful contributions during the initial conceptualisation of the study.

References

American College of Sports Medicine. *ACSM'S guidelines for exercise testing and prescription*. 10th Edition. Wolters Kluwer, 389.

Armstrong, R. A. (2014). When to use the Bonferroni correction. *Ophthalmic & Physiological Optics, 34*, 502-508.

Beauchamp, M., Crawford, K., & Jackson, B. (2018). Social cognitive theory and physical activity: Mechanisms of behaviour change, critique, and legacy. *Psychology of Sport and Exercise, 42,* 110-117. https://doi:10.1016/j.psychsport.2018.11.009

Borenstein, M., Hedges, L. V., Higgins, J., & Rothstein, H. (2015). *Comprehensive Meta-Analysis: Version 3.0 [Computer Program]*. Biostat.

Borg, G. (1998). *Borg's perceived exertion and pain scales.* Champaign, IL: Human Kinetics.

Boyce, B. A. (1994). The effects of goal setting on performance and spontaneous goal setting behavior of experienced pistol shooters. *The Sport Psychologist, 8,* 87-93. https://doi.org/10.1123/tsp.8.1.87

Burr, J. F., Bredin, S. S. D., Faktor, M. D., & Warburton, D. E. R. (2011). The 6-minute walk test as a predictor of objectively measured aerobic fitness in healthy working-aged adults. *The Physician and Sports Medicine, 39*(2), 133-139. https://doi: 10.3810/psm.2011.05.1904

Chen, M., Fan, X., & Moe, S. (2002). Criterion-validity of the Borg ratings of perceived exertion scale in healthy individuals: A meta-analysis. *Journal of Sports Sciences, 20,* 873-899. https://doi:10.1080/026404102320761787

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences.* 2nd Edition. Lawrence Erlbaum.

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B., Pratt, M., Ekelund, U., Yngve, Y., Sallis, J. F., & Pekka, O. (2003). International

Physical Activity Questionnaire: 12-country reliability and validity. *Medicine and Science in Sport and Exercise, 35*(8), 1381-1395. https://doi:10.1249/01.MSS.0000078924.61453.FB

Demers, C., McKelvie, R. S., Negassa, A., & Yusuf, S. (2001). Reliability, validity, and responsiveness of the six-minute walk test in patients with heart failure. *American Heart Journal, 142*(4), 698-703. https://doi:10.1067/mhj.2001.118468

Doran, G. T. (1981). There's a S.M.A.R.T. Way to write Management's goals and objectives. *Management Review, 70,* 35-36.

Drach-Zahavy, A., & Erez, M. (2002). Challenge versus threat effects on the goal-performance relationship. *Organisational Behaviour and Human Decision Process, 88,* 667-682. http://dx.doi.org/10.1016/S0749-5978(02)00004-3

Ekkekakis, P., & Brand, R. (2019). Affective responses to and automatic affective valuations of physical activity: Fifty years of progress on the seminal question in exercise psychology. *Journal of Sport and Exercise, 42,* 1-166. https://doi:10.1016/j.psychsport.2018.12.018

Ekkekakis, P., Hargreave, E. A., & Parfitt, G. (2013). Envisioning the next fifty years of research on the exercise-affect relationship. *Psychology of Sport and Exercise, 14,* 751-758. http://dx.doi.org/10.1016/j.psychsport.2013.04.007

Ekkekakis, P., & Petruzzello, S. J. (1999). Acute aerobic exercise and affect: Current status, problems and prospects regarding dose-responses. *Sports Medicine, 28,* 337-374. https://doi:10.2165/00007256-199928050-00005

Ekkekakis, P., & Petruzzello, S. J. (2001). Analysis of the affect measurement conundrum in exercise psychology: I. Fundamental issues. *Psychology of Sport and Exercise, 2,* 71-88.

Enright, P. L. (2003). The six-minute walk test. *Respiratory Care, 48*(8), 783-785.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioural, and biomedical sciences. *Behavior Research Methods, 39*(2), 175-191.

Giannini, J. M., Weinberg, R. S., & Jackson, A. J. (1988). The effects of mastery, competitive, and cooperative goals on the performance of simple and complex basketball skills. *Journal of Sport and Exercise Psychology, 10,* 408-417.

Hamilton, D. M., & Haennel, R. G. (2000). Validity and reliability of the 6-minute walk test in a cardiac rehabilitation population. *Journal of Cardiopulmonary Rehabilitation, 20*(3), 156-164.

Hardy, C. J., & Rejeski, W. J. (1989). Not what, but how one feels: The measurement of affect during exercise. *Journal of Sport and Exercise Psychology, 11,* 304-317.

Kendzierski, D., & DeCarlo, K. J. (1991). Physical activity enjoyment scale: Two validation studies. *Journal of Sport and Exercise Psychology*, *13*(1), 50-64. http://doi.org/10.1123/jsep.13.1.50

Kiviniemi, M. T., Voss-Humke, A. M., & Seifert, A. L. (2007). How do I feel about the behaviour? The interplay of affective associations with behaviours and cognitive beliefs as influences on physical activity behaviour. *Health Psychology*, *26,* 152-158. https://doi:10.1037/0278-6133.26.2.152

Kwan, B. M., & Bryan, A. D. (2010). In-task and post-task affective response to exercise: Translating exercise intentions into behaviour. *British Journal of Health Psychology, 15,* 115-131. https://doi:10.1348/135910709X433267

Latham, G. P., & Locke, E. A. (1991). Self-regulation through goal setting. *Organizational Behavior and Human Decision Processes, 50*(2), 212-247. http://dx.doi.org/10.1016/0749-5978(91)90021-K

Locke, E. A., & Latham, G. P. (2013). *New developments in goal setting and task performance.* New York, NY: Routledge.

Locke, E. A., Shaw, K. N., Saari, L. M., & Latham, G. P. (1981). Goal setting and task performance: 1969-1980. *Psychological Bulletin, 90*(1), 125-152. http://dx.doi.org/10.1037/0033-2909.90.1.125

McAuley, E., & Courneya, K. S. (1994). The Subjective Exercise Experiences Scale (SEES): Development and preliminary validation. *Journal of Sport and Exercise Psychology, 16,* 163-177. https://doi.org/10.1123/jsep.16.2.163

McAuley, E., Morris, K., Motl, R., Hu, L., Konopack, J., & Elavsky, S. (2007). Long-term follow-up of physical activity behaviour in older adults. *Health Psychology, 26,* 375-380. https://doi:10.1207/s15324796abm3002_6

McEwan, D., Harden, S. M., Zumbo, B. D., Sylvester, B. D., Kaulius, M., Ruissen, G. R., Dowd, A, J., & Beauchamp, M. R. (2016). The effectiveness of multi-component goal setting interventions for changing physical activity behaviour: A systematic review and meta-analysis. *Health Psychology Review, 10*(1), 67-88. http://doi.org/10.1080/17437199.2015.1104258

Montoya, A. K., & Hayes, A. F. (2017). Two-condition within-participant statistical mediation analysis: A path-analytic framework. *Psychological Methods, 22*(1), 6-27. http://dx.doi.org/10.1037/met0000086

Moving Medicine. (2019, July 30). *Prescribing Movement.* Retrieved from http://movingmedicine.ac.uk/prescribing-movement/

National Health Service. (2019, July 4). *Physical activity guidelines for adults.* Retrieved from https://www.nhs.uk/live-well/exercise/

Nakagawa, S. (2004). A farewell to Bonferroni: the problems of low statistical power and publication bias. *Behavioral Ecology, 15(6),* 1044-1045.

Rhodes, R. E., Fiala, B., & Conner, M. (2009). A review and meta-analysis of affective judgements and physical activity in adult populations. *Annals of Behavioural Medicine, 38,* 180-204. https://doi.org/10.1007/s12160-009-9147-y

Rhodes, R. E., & Kates, A. (2015). Can the affective response to exercise predict future motives and physical activity behaviour? A systematic review of published evidence. *Annals of Behavioural Medicine, 49,* 1-17. https://doi.org/10.1007/s12160-015-9704-5

Schweickle, M., Groves, S., Vella, S. A., & Swann, C. (2017). The effects of open vs. specific goals on flow and clutch states in a cognitive task. *Psychology of Sport and Exercise,* 3345-3354. http://dx.doi.org/10.1016/j.psychsport.2017.08.002

Sudeck, G., Schmid, J., & Conzelmann, A. (2016). Exercise experiences and changes in affective attitude: Direct and indirect effects of in situ measurements of experiences. *Frontiers in Psychology, 7,* 900. https://doi.org/10.3389/fpsyg.2016.00900

Svebak, S., & Murgatroyd, S. (1985). Metamotivational dominance: a multimethod validation of reversal theory constructs. *Journal of Personality and Social Psychology, 48*(1), 107-116. http://dx.doi.org/10.1037/0022-3514.48.1.107

Swann, C., Crust, L., Jackman, P., Vella, S. A., Allen, M. S., & Keegan, R. (2017). Psychological states underlying excellent performance in sport: Toward an integrated model of flow and clutch states. *Journal of Applied Sport Psychology, 29*(4), 375-401. http://dx.doi.org/10.1080/10413200.2016.1272650

Swann, C., Keegan, R., Crust, L., & Piggott, D. (2016). Psychological states underlying excellent performance in professional golfers: “Letting it happen” vs. “making it happen.” *Psychology of Sport and Exercise, 23,* 101-113. https://doi.org/10.1016/j.psychsport.2015.10.008

Swann, C., & Rosenbaum, S. (2018). Do we need to reconsider best practice in goal setting for physical activity promotion? *British Journal of Sports Medicine, 52*(8), 485-486. https://doi:10.1136/bjsports-2017-098186

Swann, C., Hooper, A., Schweickle, M. J., Peoples, G., Mullan, J., Hutto, D., Allen, M. S., & Vella, S. A. (2019). Comparing the effects of goal type in a walking session with healthy adults: Preliminary evidence for open goals in physical activity. *Psychology of Sport and Exercise Psychology,* 1-10. https://doi:10.1016/j.psychsport.2019.01.003

Swann, C., Rosenbaum, S., Lawrence, A., Vella, S., McEwan, D., & Ekkekakis, P. (in press). Updating goal-setting theory in physical activity promotion: A critical conceptual review. *Health Psychology Review*. https://doi.org/10.1080/17437199.2019.1706616

Thomas, S., Reading, J., & Shephard, R. (1992). Revision of the Physical Activity Readiness Questionnaire (PAR-Q). *Canadian Journal of Sport Sciences, 17*(4), 338-345.

Van Landuyt, L. M., Ekkekakis, P., Hall, E. E., & Petruzzello, S. J. (2000). Throwing the mountains into the lakes: On the perils of nomothetic conceptions of the exercise-affect relationship. *Journal of Sport and Exercise Psychology, 22,* 208-234. http://doi.org/10.1123/jsep.22.3.208

Table 1: Participant characteristics.

Characteristic	Active male (n = 9)	Active female (n = 9)	Insufficiently active male (n = 8)	Insufficiently active (female n = 10)
Age (yr)	26.67 ± 2.88	24.89 ± 4.04	27.75 ± 7.57	28.70 ± 5.62
Body mass (kg)	82.72 ± 9.36	65.06 ± 10.88	89.16 ± 15.24	78.04 ± 12.26
Height (cm)	178.78 ± 8.05	168.10 ± 4.44	181.08 ± 5.10	164.53 ± 3.29
BMI (kg-m^{-2})	25.89	22.96	27.14	28.81

Notes: Values are presented as M ± SD. BMI = body mass index.

Table 2: Between-group differences for all variables, across attempts.

Variable	Attempt	Value	Active				Insufficiently active			
			Specific [a]	Open [b]	DYB [c]	Control [d]	Specific [e]	Open [f]	DYB [g]	Control [h]
Distance	1	*EMM* (*SD*)	473.44 (30.49) [e]	463.32 (23.10)	455.78 (31.14)	471.10 (20.86) [h]	447.63 (37.14) [a]	461.77 (31.55)	449.23 (38.00)	450.61 (38.14) [d]
		95% CI lower, upper	458.28, 488.61	451.83, 474.80	440.29, 471.27	460.72, 481.48	429.16, 466.10	446.08, 477.46	430.33, 468.13	431.16, 469.09
	2	*EMM* (*SD*)	581.59 (45.67)	546.55 (55.57) [f]	562.97 (59.94)	471.06 (29.28)	566.79 (42.58)	583.44 (33.36) [b]	559.45 (36.05)	464.95 (59.28)
		95% CI lower, upper	558.88, 604.29	518.92, 574.18	533.16, 592.77	456.49, 485.62	545.61, 587.96	566.85, 600.03	541.52, 577.38	435.47, 494.43
	3	*EMM* (*SD*)	624.20 (55.81)	566.63 (64.28) [f]	576.46 (71.15)	476.62 (29.39)	595.14 (60.39)	616.66 (52.13) [b]	598.17 (54.24)	460.39 (56.65)
		95% CI lower, upper	596.45, 651.95	534.67, 598.60	541.08, 611.85	462.00, 491.23	565.12, 625.17	590.74, 642.58	571.19, 625.15	432.22, 488.56
Perceived Exertion	1	*EMM* (*SD*)	7.32 (0.61) [e]	7.04 (0.46) [f]	7.32 (0.58) [g]	6.94 (0.42) [h]	8.47 (1.39) [a]	8.29 (1.45) [b]	8.17 (1.27) [c]	8.09 (1.35) [d]
		95% CI lower, upper	7.02, 7.62	6.81, 7.27	7.03, 7.61	6.73, 7.16	7.78, 9.17	7.57, 9.01	7.53, 8.80	7.42, 8.77
	2	*EMM* (*SD*)	8.54 (0.96) [e]	8.61 (0.99) [f]	8.83 (0.74) [g]	6.97 (0.32) [h]	10.72 (1.80) [a]	10.71 (1.89) [b]	10.74 (1.79) [c]	8.44 (1.60) [d]
		95% CI lower, upper	8.06, 9.02	8.12, 9.10	8.46, 9.20	6.81, 7.13	9.83, 11.62	9.77, 11.65	9.84, 11.63	7.65, 9.24
	3	*EMM* (*SD*)	9.32 (1.55) [e]	9.01 (1.22) [f]	9.11 (1.05) [g]	7.15 (0.48) [h]	11.79 (2.30) [a]	11.29 (1.82) [b]	11.59 (1.95) [c]	8.44 (1.59) [d]
		95% CI lower, upper	8.55, 10.09	8.41, 9.62	8.59, 9.64	6.91, 7.39	10.65, 12.94	10.38, 12.19	10.63, 12.57	7.65, 9.24
Affect	1	*EMM* (*SD*)	2.36 (1.04)	2.24 (1.25)	2.15 (1.31)	1.86 (1.23)	2.00 (1.10)	2.00 (0.84)	2.29 (0.86)	1.86 (0.91)
		95% CI lower, upper	1.85, 2.88	1.61, 2.86	1.50, 2.81	1.25, 2.47	1.45, 2.55	1.58, 2.42	1.86, 2.72	1.41, 2.31
	2	*EMM* (*SD*)	2.56 (1.30)	2.46 (1.09)	2.18 (1.34)	1.83 (1.37)	1.89 (1.14)	2.75 (0.90)	2.63 (0.99)	1.54 (1.14)
		95% CI lower, upper	1.91, 3.20	1.91, 3.00	1.51, 2.85	1.15, 2.52	1.32, 2.45	2.30, 3.19	2.13, 3.12	0.97, 2.11
	3	*EMM* (*SD*)	2.88 (1.38) [e]	2.47 (1.21)	2.29 (1.54)	1.63 (1.44)	1.39 (1.35) [a]	3.15 (1.16)	2.90 (1.21)	1.07 (1.29)
		95% CI lower, upper	2.19, 3.56	1.87, 3.08	1.53, 3.06	0.91, 2.34	0.72, 2.06	2.57, 3.73	2.29, 3.51	0.53, 1.61
Arousal	1	*EMM* (*SD*)	1.94 (0.66)	1.99 (1.21)	2.06 (0.79)	1.79 (0.88)	2.22 (0.77)	2.26 (0.68)	2.35 (0.89)	2.17 (0.75)
		95% CI lower, upper	1.62, 2.27	1.38, 2.59	1.66, 2.45	1.36, 2.23	1.84, 2.61	1.92, 2.60	1.89, 2.79	1.79, 2.54
	2	*EMM* (*SD*)	2.85 (1.10)	2.50 (1.00) [f]	2.58 (0.89) [g]	1.75 (0.99)	3.21 (0.89)	3.35 (0.93) [b]	3.28 (0.78) [c]	1.82 (0.74)
		95% CI lower, upper	2.29, 3.39	2.00, 2.99	2.14, 3.03	1.26, 2.24	2.76, 3.65	2.88, 3.81	2.89, 3.66	1.45, 2.19
	3	*EMM* (*SD*)	3.24 (1.11)	2.67 (1.28) [f]	2.82 (1.25) [g]	1.58 (0.82)	3.56 (1.20)	3.75 (1.01) [b]	3.86 (1.01) [c]	1.65 (0.79)
		95% CI lower, upper	2.68, 3.79	2.03, 3.30	2.20, 3.44	1.18, 1.99	2.96, 3.79	3.25, 4.25	3.35, 4.37	1.26, 2.04
Perceived Confidence	1	*EMM* (*SD*)	9.78 (0.43) [e]	9.78 (0.65) [f]	9.61 (0.85) [g]	9.44 (1.29) [h]	8.39 (1.65) [a]	8.22 (1.56) [b]	8.78 (1.48) [c]	7.94 (1.69) [d]
		95% CI lower, upper	9.57, 9.99	9.46, 10.10	9.19, 10.03	8.80, 10.09	7.57, 9.21	7.45, 9.00	8.04, 9.51	7.10, 8.79
	2	*EMM* (*SD*)	8.22 (1.83) [e]	9.00 (0.97)	9.33 (0.84) [g]	8.94 (1.73) [h]	6.33 (1.45) [a]	8.39 (0.92)	8.28 (1.53) [c]	7.44 (1.95) [d]
		95% CI lower, upper	7.31, 9.13	8.52, 9.48	8.92, 9.75	8.08, 9.81	5.61, 7.06	7.93, 8.84	7.52, 9.04	6.48, 8.41
	3	*EMM* (*SD*)	7.89 (1.94) [e]	8.83 (1.29)	9.11 (1.13)	9.17 (1.54) [h]	5.39 (2.33) [a]	8.78 (0.88)	8.50 (1.09)	7.39 (2.25) [d]
		95% CI lower, upper	6.93, 8.85	8.19, 9.48	8.55, 9.67	8.40, 9.93	4.23, 6.55	8.34, 9.21	7.95, 9.05	6.27, 8.51

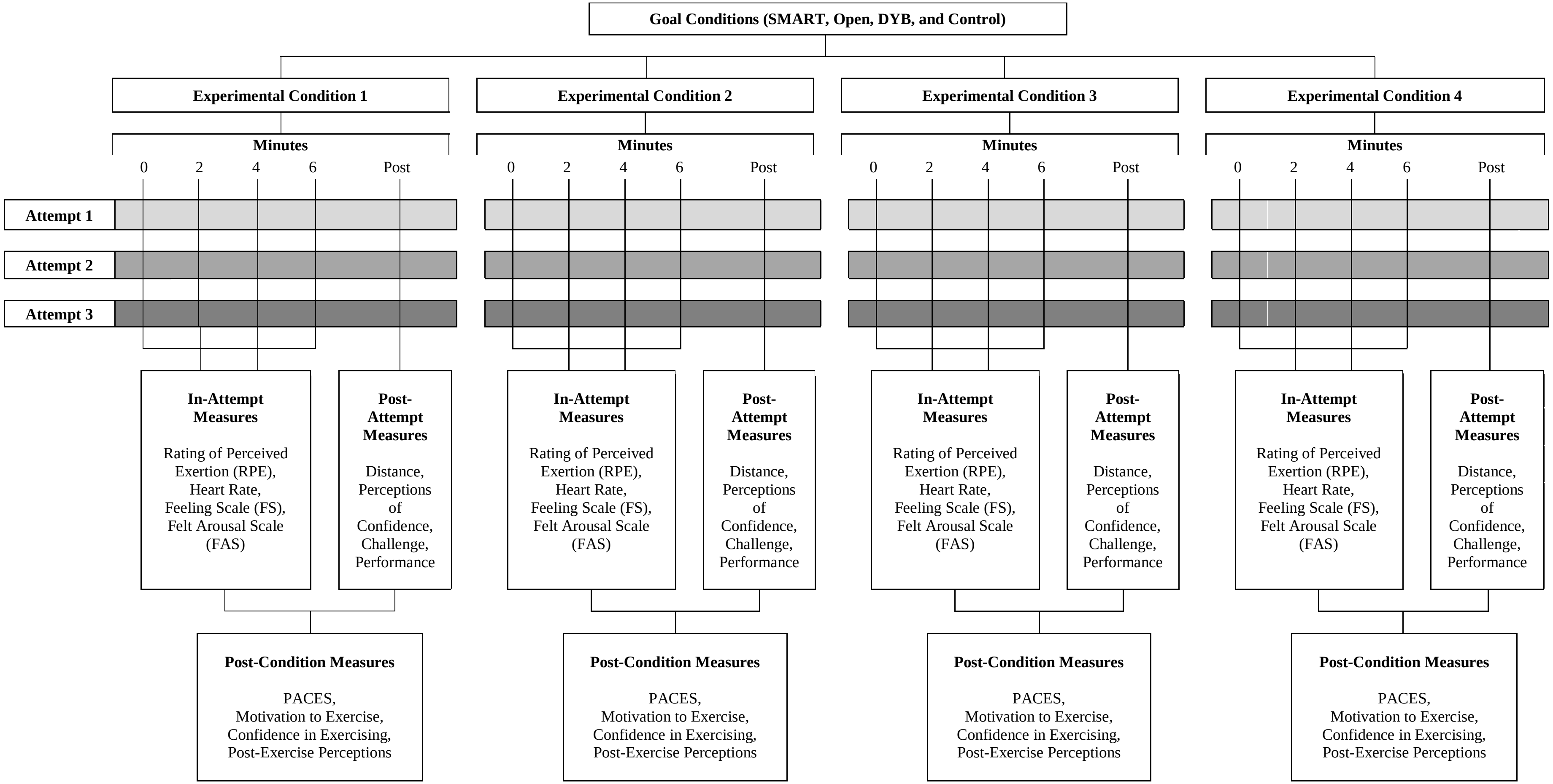
Perceived Performance	1	*EMM* (*SD*)	8.67 (2.00)	9.06 (1.11) [f]	8.72 (1.60)	8.17 (2.59)	7.83 (1.62)	7.61 (1.65) [b]	7.89 (1.57)	7.50 (2.12)
		95% CI lower, upper	7.67, 9.66	8.50, 9.61	7.93, 9.52	6.88, 9.46	7.03, 8.64	6.79, 8.43	7.11, 8.67	6.45, 8.55
	2	*EMM* (*SD*)	8.28 (1.57) [e]	8.22 (1.19)	8.06 (1.55)	7.61 (2.25)	6.50 (1.50) [a]	8.22 (1.00)	8.00 (1.53)	7.33 (2.00)
		95% CI lower, upper	7.50, 9.06	7.74, 8.92	7.28, 8.83	6.49, 8.73	5.75, 7.25	7.72, 8.72	7.24, 8.76	6.34, 8.33
	3	*EMM* (*SD*)	7.61 (1.54) [e]	8.17 (1.95)	8.00 (2.19)	8.00 (1.97)	5.28 (2.05) [a]	8.33 (1.24)	8.33 (1.61)	6.67 (2.79)
		95% CI lower, upper	6.85, 8.38	7.20, 9.14	6.91, 9.09	7.02, 8.98	4.26, 6.30	7.72, 8.95	7.53, 9.13	5.28, 8.05
Perceived Challenge	1	*EMM* (*SD*)	1.72 (1.60)	1.50 (1.54) [f]	1.39 (1.69) [g]	2.06 (1.79)	2.33 (1.72)	2.72 (1.71) [b]	1.39 (1.69) [c]	2.06 (1.79)
		95% CI lower, upper	0.93, 2.52	0.73, 2.27	0.55, 2.23	1.16, 2.95	1.48, 3.19	1.87, 3.57	2.02, 3.53	1.56, 3.00
	2	*EMM* (*SD*)	5.67 (1.94) [e]	4.06 (2.34) [f]	5.28 (3.41)	2.22 (1.87)	7.78 (1.63) [a]	5.94 (2.26) [b]	6.61 (2.03)	2.94 (2.04)
		95% CI lower, upper	4.70, 6.63	2.89, 5.22	3.58, 6.97	1.29, 3.15	6.97, 8.59	4.82, 7.07	5.60, 7.62	1.93, 3.96
	3	*EMM* (*SD*)	7.06 (1.73) [e]	5.17 (2.75) [f]	5.22 (3.09) [g]	2.11 (1.75)	8.89 (0.96) [a]	7.06 (2.53) [b]	7.33 (2.19) [c]	2.94 (2.18)
		95% CI lower, upper	6.19, 7.92	3.80, 6.53	3.68, 6.76	1.24, 2.98	8.41, 9.37	5.80, 8.31	6.24, 8.43	1.86, 4.03
Enjoyment		*EMM* (*SD*)	98.44 (16.46) [e]	87.06 (21.43) [f]	92.50 (17.71)	80.06 (15.92)	84.33 (17.53) [a]	104.72 (10.76) [b]	100.72 (12.03)	75.94 (18.72)
		95% CI lower, upper	90.30, 106.59	78.93, 95.18	85.25, 99.76	71.73, 88.38	76.19, 92.48	96.59, 112.85	93.47, 107.98	67.62, 84.27
Motivation to exercise		*EMM* (*SD*)	9.00 (1.09) [e]	7.72 (2.24)	8.44 (1.54)	7.83 (1.76) [h]	6.72 (1.74) [a]	8.83 (1.04)	8.06 (1.66)	6.22 (1.89) [d]
		95% CI lower, upper	8.46, 9.54	6.61, 8.84	7.68, 9.21	6.96, 8.71	5.86, 7.59	8.31, 9.35	7.23, 8.88	5.28, 7.17
Confidence in exercising		*EMM* (*SD*)	9.39 (1.19) [e]	9.56 (0.78) [f]	9.50 (0.70) [g]	9.50 (0.70) [h]	6.06 (2.44) [a]	8.61 (1.24) [b]	8.17 (1.33) [c]	6.78 (2.07) [d]
		95% CI lower, upper	8.79, 9.98	9.17, 9.95	9.15, 9.85	9.15, 9.85	4.84, 7.27	7.99, 9.23	7.50, 8.83	5.75, 7.81
Future exercise intentions		*EMM* (*SD*)	9.89 (0.47) [e]	9.83 (0.51) [f]	9.56 (1.19)	9.33 (1.08) [h]	6.83 (2.50) [a]	9.06 (1.06) [b]	8.67 (1.53)	6.78 (2.49) [d]
		95% CI lower, upper	9.65, 10.12	9.58, 10.09	8.96, 10.15	8.79, 9.87	5.59, 8.08	8.53, 9.58	7.90, 9.43	5.54, 8.01

Notes: *EMM* = Estimated marginal means; *CI* = 95% Confidence Intervals (lower, upper); Significant differences ($p < .05$) are indicated for the active group as: a = Specific goal condition; b = Open goal condition; c = DYB goal condition; d = Control goal condition. Significant differences ($p < .05$) are indicated for the inactive group as: e = Specific goal condition; f = Open goal condition; g = DYB goal condition; h = Control goal condition.

Table 3: Indirect effects of goal type on distance achieved via in-task measures compared to control condition.

Paired conditions	Mediator	Coefficient	*SE*	Lower CI	Upper CI
Specific vs. control	RPE	21.23	7.31	6.28	36.17
	Affect	-6.16	8.25	-23.03	10.72
	Arousal	9.46	11.31	-13.67	32.59
Open vs. control	RPE	27.75	6.85	13.74	41.76
	Affect	-3.03	8.14	-19.68	13.62
	Arousal	10.71	9.36	-8.43	29.84
DYB vs. control	RPE	30.47	8.08	13.95	47.00
	Affect	17.01	13.33	-10.26	44.29
	Arousal	-7.67	14.89	-38.12	22.79

Notes: CI = confidence intervals; *SE* = standard error; *DYB* = do-your-best; *RPE* = rating of perceived exertion.



Supplementary File, Figure 1: An overview of the experiment protocol. Note: *DYB* = do-your-best; PACES = Physical Activity Enjoyment Scale; Experimental conditions are listed as 1, 2, 3, 4 to represent the counterbalanced ordering of the goal conditions.

Supplementary File, Table 1: Within-group differences for all variables across goal condition, and attempt.

Variable	Group		Goal Condition: Specific ^{a}	Goal Condition: Open ^{b}	Goal Condition: DYB ^{c}	Goal Condition: Control ^{d}	Attempt: 1 ^{e}	Attempt: 2 ^{f}	Attempt: 3 ^{g}
Distance	Active	*EMM*	559.74 $^{b\,d}$	525.50 $^{a\,d}$	531.74 ^{d}	472.92 $^{a\,b\,c}$	465.91 $^{f\,g}$	540.54 $^{e\,g}$	560.98 $^{e\,f}$
		95% CI lower, upper	542.34, 577.15	503.75, 547.25	506.69, 556.79	461.14, 484.71	456.30, 475.52	519.93, 561.15	539.49, 582.46
	Insufficiently active	*EMM*	536.52 $^{b\,d}$	553.96 $^{a\,d}$	535.62 ^{d}	458.49 $^{a\,b\,c}$	452.19 $^{f\,g}$	543.66 $^{e\,g}$	567.59 $^{e\,f}$
		95% CI lower, upper	516.72, 556.33	536.65, 571.26	517.16, 554.08	434.86, 482.12	436.67, 467.71	526.62, 560.69	544.32, 590.87
	Overall	*EMM*	548.13 ^{d}	539.73 ^{d}	533.69 ^{d}	465.71 $^{a\,b\,c}$	459.05 $^{f\,g}$	542.09 $^{e\,g}$	564.29 $^{e\,f}$
		95% CI lower, upper	535.43, 560.83	526.34, 553.11	518.69, 548.66	452.99, 478.42	450.26, 467.84	529.22, 554.98	549.03, 579.54
Perceived Exertion	Active	*EMM*	8.39 ^{d}	8.22 ^{d}	8.42 ^{d}	7.02 $^{a\,b\,c}$	7.16 $^{f\,g}$	8.24 $^{e\,g}$	8.65 $^{e\,f}$
		95% CI lower, upper	7.95, 8.84	7.85, 8.59	8.13, 8.72	6.85, 7.19	6.95, 7.36	7.98, 8.50	8.29, 9.01
	Insufficiently active	*EMM*	10.33 ^{d}	10.09 ^{d}	10.17 ^{d}	8.33 $^{a\,b\,c}$	8.26 $^{f\,g}$	10.15 $^{e\,g}$	10.78 $^{e\,f}$
		95% CI lower, upper	9.46, 11.19	9.30, 10.89	9.44, 10.89	7.61, 9.05	7.64, 8.88	9.39, 10.91	9.95, 11.61
	Overall	*EMM*	9.36 ^{d}	9.16 ^{d}	9.29 ^{d}	7.68 $^{a\,b\,c}$	7.71 $^{f\,g}$	9.17 $^{e\,g}$	9.72 $^{e\,f}$
		95% CI lower, upper	8.89, 9.83	8.74, 9.58	8.92, 9.67	7.32, 8.03	7.39, 8.02	8.81, 9.58	9.28, 10.15
Affect	Active	*EMM*	2.59 ^{d}	2.39 ^{d}	2.21 ^{d}	1.77 $^{a\,b\,c}$	2.15	2.25	2.32
		95% CI lower, upper	2.00, 3.19	1.82, 2.96	1.56, 2.85	1.13, 2.42	1.60, 2.70	1.69, 2.83	1.72, 2.91
	Insufficiently active	*EMM*	1.76 $^{b\,c}$	2.63 $^{a\,d}$	2.61 $^{a\,d}$	1.49 $^{b\,c}$	2.04	2.20	2.13
		95% CI lower, upper	1.28, 2.24	2.19, 3.07	2.17, 3.04	1.02, 1.96	1.65, 2.42	1.78, 2.62	1.67, 2.59
	Overall	*EMM*	2.18 ^{d}	2.51 ^{d}	2.41 ^{d}	1.63 $^{a\,b\,c}$	2.09	2.23	2.22
		95% CI lower, upper	1.81, 2.55	2.16, 2.86	2.03, 2.78	1.25, 2.02	1.77, 2.42	1.89, 2.57	1.86, 2.58
Arousal	Active	*EMM*	2.68 ^{d}	2.38 ^{d}	2.49 ^{d}	1.71 $^{a\,b\,c}$	1.94 $^{f\,g}$	2.42 ^{e}	2.58 ^{e}
		95% CI lower, upper	2.24, 3.11	1.85, 2.92	2.07, 2.89	1.29, 2.13	1.56, 2.33	1.99, 2.85	2.13, 3.03
	Insufficiently active	*EMM*	2.99 ^{d}	3.12 ^{d}	3.16 ^{d}	1.88 $^{a\,b\,c}$	2.25 $^{f\,g}$	2.91 $^{e\,g}$	3.21 $^{e\,f}$
		95% CI lower, upper	2.61, 3.38	2.76, 3.48	2.79, 3.53	1.54, 2.21	1.92, 2.58	2.58, 3.24	2.84, 3.57
	Overall	*EMM*	2.84 ^{d}	2.75 ^{d}	2.82 ^{d}	1.79 $^{a\,b\,c}$	2.09 $^{f\,g}$	2.67 $^{e\,g}$	2.89 $^{e\,f}$
		95% CI lower, upper	2.56, 3.11	2.44, 3.06	2.56, 3.09	1.54, 2.05	1.85, 2.34	2.40, 2.93	2.61, 3.17
Perceived Confidence	Active	*EMM*	8.63	9.20	9.35	9.19	9.65 $^{f\,g}$	8.88 ^{e}	8.75 ^{e}
		95% CI lower, upper	8.03, 9.23	8.79, 9.62	8.98, 9.73	8.48, 9.89	9.39, 9.92	8.42, 9.33	8.21, 9.29
	Insufficiently active	*EMM*	6.70 $^{b\,c}$	8.46 ^{a}	8.52 ^{a}	7.59	8.33 $^{f\,g}$	7.61 ^{e}	7.51 ^{e}
		95% CI lower, upper	6.04, 7.37	8.09, 8.83	7.92, 9.11	6.65, 8.54	7.65, 9.02	7.07, 8.15	6.93, 8.09
	Overall	*EMM*	7.67 $^{b\,c}$	8.83 ^{a}	8.94 ^{a}	8.39	8.99 $^{f\,g}$	8.24 ^{e}	8.13 ^{e}
		95% CI lower, upper	7.24, 8.09	8.56, 9.10	8.59, 9.27	7.82, 8.96	8.64, 9.35	7.90, 8.58	7.75, 8.51
Perceived Performance	Active	*EMM*	8.19	8.52	8.25	7.93	8.65	8.07	7.94
		95% CI lower, upper	7.64, 8.73	7.89, 9.14	7.59, 8.93	6.93, 8.92	7.96, 9.35	7.47, 8.67	7.23, 8.66
	Insufficiently active	*EMM*	6.54 $^{b\,c}$	8.06 ^{a}	8.07 ^{a}	7.17	7.71	7.51	7.15
		95% CI lower, upper	5.93, 7.14	7.71, 8.40	7.45, 8.69	6.06, 8.27	6.94, 8.48	7.04, 7.98	6.52, 7.79
	Overall	*EMM*	7.36 $^{b\,c}$	8.29 ^{a}	8.17 ^{a}	7.55	8.18 ^{g}	7.79	7.55 ^{e}
		95% CI lower, upper	6.97, 7.75	7.95, 8.63	7.73, 8.61	6.83, 8.26	7.68, 8.68	7.42, 8.16	7.08, 8.01

Perceived Challenge	Active	*EMM*	4.82 [d]	3.57 [d]	3.96	2.13 [a b]	1.67 [f g]	4.31 [e g]	4.89 [e f]
		95% CI lower, upper	4.19, 5.43	2.60, 4.55	2.85, 5.08	1.26, 3.00	0.95, 2.38	3.59, 5.01	4.21, 5.57
	Insufficiently active	*EMM*	6.33 [b d]	5.24 [a d]	5.57 [d]	2.72 [a b c]	2.53 [f g]	5.82 [e g]	6.56 [e f]
		95% CI lower, upper	5.78, 6.89	4.26, 6.22	4.77, 6.38	1.88, 3.57	1.93, 3.13	5.04, 6.59	5.80, 7.31
	Overall	*EMM*	5.57 [b d]	4.41 [a d]	4.77 [d]	2.43 [a b c]	2.09 [f g]	5.06 [e g]	5.72 [e f]
		95% CI lower, upper	5.17, 5.97	3.74, 5.07	4.11, 5.43	1.84, 3.01	1.65, 2.55	4.56, 5.57	5.23, 6.21

Notes: *EMM* = Estimated marginal means; *CI* = 95% Confidence Intervals (lower, upper); Significant differences ($p < .05$) are indicated as: a = Specific goal condition; b = Open goal condition; c = DYB goal condition; d = Control goal condition; e = Attempt 1; f = Attempt 2; and g = Attempt 3.